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National Occupational Analysis

2012 | Insulator (Heat and Frost)

Human Resources and Skills Development Canada
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Canada

Occupational Analyses Series

Insulator (Heat and Frost)

2012

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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this National Occupational Analysis (NOA) as the national standard for the occupation of Insulator (Heat and Frost).

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. To this end, Human Resources and Skills Development Canada (HRSDC) sponsors a program, under the guidance of the CCDA, to develop a series of NOAs.

The NOAs have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and curricula for training leading to the certification of skilled workers;
- to facilitate the mobility of apprentices and skilled workers in Canada; and,
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

ACKNOWLEDGEMENTS

The CCDA and HRSDC wish to express sincere appreciation for the contribution of the many tradespersons, industrial establishments, professional associations, labour organizations, provincial and territorial government departments and agencies, and all others who contributed to this publication.

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This analysis was prepared by the Labour Market Integration Directorate of HRSDC. The coordinating, facilitating and processing of this analysis were undertaken by employees of the NOA development team of the Trades and Apprenticeship Division. The jurisdiction of British Columbia also participated in the development of this NOA.

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LIST OF PUBLISHED NATIONAL OCCUPATIONAL ANALYSES (Red Seal Trades)

TITLE	NOC* Code
Agricultural Equipment Technician (2007)	7312
Appliance Service Technician (2011)	7332
Automotive Painter (2009)	7322
Automotive Service Technician (2011)	7321
Baker (2011)	6332
Boilermaker (2008)	7234
Bricklayer (2011)	7281
Cabinetmaker (2012)	7272
Carpenter (2010)	7271
Concrete Finisher (2006)	7282
Construction Craft Worker (2009)	7241
Construction Electrician (2011)	7241
Cook (2011)	6322
Electrical Rewind Mechanic (1999)	7333
Floorcovering Installer (2012)	7295
Glazier (2008)	7292
Hairstylist (2011)	6341
Heavy Duty Equipment Technician (2009)	7312
Heavy Equipment Operator (2012)	7521
Industrial Electrician (2011)	7242
Industrial Mechanic (Millwright) (2009)	7311
Instrumentation and Control Technician (2010)	2243
Insulator (Heat and Frost) (2012)	7293
Ironworker (Generalist) (2010)	7236
Ironworker (Reinforcing) (2010)	7236
Ironworker (Structural/Ornamental) (2010)	7236
Landscape Horticulturist (2010)	2225
Lather (Interior Systems Mechanic) (2012)	7284

*National Occupational Classification

TITLE	NOC* Code
Machinist (2010)	7235
Metal Fabricator (Fitter) (2008)	7263
Mobile Crane Operator (2009)	7371
Mobile Crane Operator (Hydraulic) (2012)	7371
Motorcycle Mechanic (2006)	7334
Motor Vehicle Body Repairer (Metal and Paint) (2010)	7322
Oil Burner Mechanic (2006)	7331
Painter and Decorator (2011)	7294
Partsperson (2010)	1522
Plumber (2010)	7251
Powerline Technician (2009)	7244
Recreation Vehicle Service Technician (2006)	7384
Refrigeration and Air Conditioning Mechanic (2009)	7313
Rig Technician (2008)	8232
Roofer (2006)	7291
Sheet Metal Worker (2010)	7233
Sprinkler System Installer (2009)	7252
Steamfitter – Pipefitter (2010)	7252
Tilesetter (2010)	7283
Tool and Die Maker (2010)	7232
Tower Crane Operator (2012)	7371
Transport Trailer Technician (2008)	7321
Truck and Transport Mechanic (2010)	7321
Welder (2009)	7237

Comments or questions about National Occupational Analyses may be forwarded to:

Trades and Apprenticeship Division
Labour Market Integration Directorate
Human Resources and Skills Development Canada
140 Promenade du Portage, Phase IV, 5th Floor
Gatineau, Quebec K1A 0J9

These publications can be downloaded online at: www.red-seal.ca. Links to Essential Skills Profiles for some of these trades are also available on this website.

STRUCTURE OF ANALYSIS

To facilitate understanding of the occupation, the work performed by tradespersons is divided into the following categories:

Blocks	the largest division within the analysis that is comprised of a distinct set of trade activities
Tasks	distinct actions that describe the activities within a block
Sub-Tasks	distinct actions that describe the activities within a task
Key Competencies	activities that a person should be able to do in order to be called 'competent' in the trade

The analysis also provides the following information:

Trends	changes identified that impact or will impact the trade including work practices, technological advances, and new materials and equipment
Related Components	a list of components, items, materials and other elements relevant to the block
Tools and Equipment	categories of tools and equipment used to perform all tasks in the block; these tools and equipment are listed in Appendix A
Context	information to clarify the intent and meaning of tasks
Required Knowledge	the elements of knowledge that an individual must acquire to adequately perform a task

The appendices located at the end of the analysis are described as follows:

Appendix A — Tools and Equipment	a non-exhaustive list of tools and equipment used in this trade
Appendix B — Glossary	definitions or explanations of selected technical terms used in the analysis
Appendix C — Acronyms	a list of acronyms used in the analysis with their full name
Appendix D — Block and Task Weighting	the block and task percentages submitted by each jurisdiction, and the national averages of these percentages; these national averages determine the number of questions for each block and task in the Interprovincial exam
Appendix E — Pie Chart	a graph which depicts the national percentages of exam questions assigned to blocks
Appendix F — Task Profile Chart	a chart which outlines graphically the blocks, tasks and sub-tasks of this analysis

DEVELOPMENT AND VALIDATION OF ANALYSIS

Development of Analysis

A draft analysis is developed by a committee of industry experts in the field led by a team of facilitators from HRSDC. This draft analysis breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

Draft Review

The NOA development team then forwards a copy of the analysis and its translation to provincial and territorial authorities for a review of its content and structure. Their recommendations are assessed and incorporated into the analysis.

Validation and Weighting

The analysis is sent to all provinces and territories for validation and weighting. Participating jurisdictions consult with industry to validate and weight the document, examining the blocks, tasks and sub-tasks of the analysis as follows:

BLOCKS	Each jurisdiction assigns a percentage of questions to each block for an examination that would cover the entire trade.
TASKS	Each jurisdiction assigns a percentage of exam questions to each task within a block.
SUB-TASKS	Each jurisdiction indicates, with a YES or a NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction.

The results of this exercise are submitted to the NOA development team who then analyzes the data and incorporates it into the document. The NOA provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for block and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

This method for the validation of the NOA also identifies common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions perform a sub-task, it shall be considered common core. Interprovincial Red Seal Examinations are based on the common core sub-tasks identified through this validation process.

Definitions for Validation and Weighting

YES	sub-task performed by qualified workers in the occupation in a specific jurisdiction
NO	sub-task not performed by qualified workers in the occupation in a specific jurisdiction
NV	analysis Not Validated by a province/territory
ND	trade Not Designated in a province/territory
NOT COMMON CORE (NCC)	sub-task, task or block performed by less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade
NATIONAL AVERAGE %	average percentage of questions assigned to each block and task in Interprovincial Red Seal Examination for the trade

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

ANALYSIS

Safe working procedures and conditions, accident prevention, and the preservation of health are of primary importance to industry in Canada. These responsibilities are shared and require the joint efforts of government, employers and employees. It is imperative that all parties become aware of circumstances that may lead to injury or harm. Safe learning experiences and work environments can be created by controlling the variables and behaviours that may contribute to accidents or injury.

It is generally recognized that safety-conscious attitudes and work practices contribute to a healthy, safe and accident-free work environment.

It is imperative to apply and be familiar with the Occupational Health and Safety (OH&S) Acts and Workplace Hazardous Materials Information System (WHMIS) Regulations. As well, it is essential to determine workplace hazards and take measures to protect oneself, co-workers, the public and the environment.

Safety education is an integral part of training in all jurisdictions. As safety is an imperative part of all trades, it is assumed and therefore it is not included as a qualifier of any activities. However, the technical safety tasks and sub-tasks specific to the trade are included in this analysis.

SCOPE OF THE INSULATOR (HEAT AND FROST) TRADE

"Insulator (Heat and Frost)" is this trade's official Red Seal occupational title approved by the CCDA. This analysis covers tasks performed by an insulator (heat and frost) whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Heat and Frost Insulator										✓			
Insulator					✓			✓	✓				
Insulator (Heat and Frost)	✓	✓	✓	✓			✓				✓	✓	✓

Insulators (heat and frost) work with different kinds of insulating material to prevent or reduce the passage of heat, cold, vapour, moisture, sound or fire. They read and interpret drawings and specifications to determine insulation requirements, select the amount and type of insulation to be installed, and measure and cut insulating material to the required dimensions. They then apply, install, repair and maintain insulating material. Insulated surfaces may be finished with materials such as plastics, aluminium, galvanized steel and coated steel, stainless steel, canvas, mastic, laminate or concrete. Some insulators (heat and frost) may also lay out and fabricate parts on-site, or remove or seal off old insulation.

Types of insulating materials that may be used include calcium silicate, ceramic fibre, elastomeric insulation, mineral fibre, fibreglass, polyurethane, polystyrene and cellular glass. They may be used for systems such as plumbing, air-handling, heating, cooling and refrigeration, for piping equipment and pressure vessels, as well as for walls, floors and ceilings of buildings, industrial complexes and ships.

Removing old insulating material such as asbestos, ceramic fibres, lead and mould is also part of the trade. Special training and licenses may be required to deal with these types of materials. Spraying insulating materials is another specialized part of the trade.

Insulators (heat and frost) are employed by construction companies, insulation contractors and industrial plants, or may also be self-employed. They work on residential, industrial, commercial and institutional projects. Their work schedules depend on the type of work they are doing, ranging from regular work weeks, to shift work or irregular work hours. Schedules may depend on the availability of contracts, or inconvenience or health risks to adjacent workers or the public.

Insulators (heat and frost) work with a number of hand tools and power tools. They use equipment such as respirators, coveralls and safety glasses to protect themselves from the hazards of materials. Also, they frequently use scaffolds, aerial lifts and ladders to help them accomplish their tasks. They can work indoors or outdoors, often in extreme temperatures. Depending on the location of work, they may be required to travel.

The ability to be focused and responsible is a vital part of insulators' (heat and frost) work and safety. The work often requires the insulators (heat and frost) to spend most of the day on their feet, bending, kneeling, working at heights, climbing (scaffolds, ladders) and lifting. Insulators (heat and frost) must be able to use their body to brace large items and guide objects or materials into place. This requires them to have a good combination of motor co-ordination, and manual and finger dexterity.

This analysis recognizes similarities or overlaps with the work of roofers, sheet metal workers, painters and carpenters.

With experience, insulators (heat and frost) act as mentors and trainers to apprentices in the trade. They can also move into positions such as maintenance, instructor, contractor, foreperson, superintendent or estimator.

There are new insulating materials being introduced such as aluminium impregnated insulation and wicking type insulation. Endothermic sheets for fireproofing electrical trays are being used more and more frequently. Their application and maintenance requires that insulators (heat and frost) stay up-to-date. More prefabricated materials have emerged, but insulators are still required to do layout and fabrication on-site.

Many tools have become more technologically advanced. For example, there are more electric and power fabrication tools such as electric rollers and shears.

Workplace safety is increasingly being driven by government regulations. Training and certification for asbestos removal is becoming prevalent in many jurisdictions. Due to growing concerns for the environment, there is an increase demand by clients for the use of insulation for energy saving purposes and environmentally friendly products such as low volatile organic compound (VOC) products.

ESSENTIAL SKILLS SUMMARY

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: www.hrsdc.gc.ca/essentialskills.

The essential skills profile for the insulator (heat and frost) trade indicates that the most important essential skills are **oral communication, problem solving** and **job task planning and organizing**. Insulators (heat and frost) at the NOA workshop also identified **numeracy** as an important essential skill.

The application of these skills may be described throughout this document within the competency statements which support each subtask of the trade. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at www.red-seal.ca.

Reading
Insulators (heat and frost) use reading skills to read manuals and details of job specifications such as material lists. They read safety notices, work permits, WHMIS sheets and labels, safety regulations and emergency procedures in order to maintain a safe work environment.

Document Use
Documents that insulators (heat and frost) work with include material lists, instructions, work orders, reports, dispatch sheets and memos. They may also consult and interpret blueprints, and complete reports on apprentices.

Writing
Insulators (heat and frost) write lists of materials and instructions. They may write accident reports or keep work records for themselves and apprentices.

Numeracy
Insulators (heat and frost) use numeracy skills for measuring and cutting pipe, and determining thickness of insulation for pipes. They use formulas for calculating surface areas of frustrums, cones, and regular and irregular shapes to estimate required materials. They also use formulas to determine energy loss.

Oral Communication
Insulators (heat and frost) use oral communication skills during daily or weekly tailgate meetings with co-workers and supervisors to discuss job details. They also meet with workers from other trades to coordinate work. Oral communication skills are important when training apprentices.

Thinking Skills
Problem solving skills are used by insulators (heat and frost) to anticipate and deal with situations such as materials not arriving as scheduled, unplanned shortages, or the wrong materials being delivered. Every job is different and often plans change requiring insulators (heat and frost) to adapt to the current requirements. Insulators (heat and frost) use their decision making skills when dealing with various issues such as where to make cuts so the material can be formed to the required shape and how to accurately cut the material to avoid waste.

Working with Others
Insulators (heat and frost) mostly work independently. They co-ordinate their work with other workers on-site including apprentices, journeypersons, foremen, supervisors and workers from other trades depending on the size of the work site and the type of work.

Computer Use
Computers may be used by insulators (heat and frost) for tasks such as accessing specifications and blueprints (Computer Assisted Drawing [CAD]), receiving work orders and for the delivery of safety training.

Continuous Learning
There is an ongoing requirement to learn while working as an insulator (heat and frost). Work sites and companies may have different protocols. Applications, materials and processes are continually changing and skills need to be kept up-to-date.

Trends Safety is increasingly recognized as an important factor in the industry. There are more computer skills required by insulators (heat and frost) in their work.

Related Components All components apply.

Tools and Equipment See Appendix A.

Task 1 Uses and maintains tools and equipment.

Context Insulators (heat and frost) use and maintain tools and equipment in a safe and proper manner. They use access equipment according to the task at hand.

Required Knowledge

K 1	types of standard hand tools such as snips, saws, knives and nippers
K 2	types of specialty hand tools such as band tensioners and band crimpers
K 3	types of standard power tools such as electric shears, drills and electric saws
K 4	types of specialty power tools such as high efficiency particulate air filter (HEPA) vacuums, negative air machines, sewing machines, stud guns and pin welders
K 5	types of layout tools such as dividers, squares, straight edges, tape measures, circumference rulers and scratch awls
K 6	types of fabrication tools and equipment such as lockformers, brakes, combination machines (beaders/crimpers) and tin snips
K 7	types of access equipment such as ladders, aerial lifts, swing stages and scaffolds
K 8	types of spray equipment such as airless, spray pumps and pressure fed
K 9	assembly and disassembly of spray equipment
K 10	limitations of equipment
K 11	laws and regulations pertaining to certification of power tools such as HEPA vacuums and negative air machines

K 12	certification requirements for access equipment such as scissor lifts and aerial platforms
K 13	required operator certification for tools such as powder-actuated tools
K 14	cleaning solvents and cleansers
K 15	maintenance procedures such as applying lubricants to moveable parts
K 16	fall protection requirements when working on access equipment
K 17	angles of ladders
K 18	three-point contact rule
K 19	scaffolding tags
K 20	worksite surroundings
K 21	barriers such as pylons, barricades, warning tapes and signage

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Sub-task

A-1.01 **Maintains tools and equipment.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-1.01.01	recognize, replace and report worn, damaged or defective tools and equipment such as tips for electric shears and hand shears
A-1.01.02	clean and lubricate tools and equipment
A-1.01.03	sharpen tools such as metal shears routinely
A-1.01.04	organize and store tools and equipment to protect them from the elements and ensure easy retrieval

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Sub-task

A-1.02 **Uses access equipment.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-1.02.01	select access equipment according to job requirements
A-1.02.02	identify and avoid hazards such as overhead obstructions and extreme wind conditions

A-1.02.03	check and ensure scaffolding tag has been updated according to company policies
A-1.02.04	set up access equipment such as step ladders, extension ladders, aerial platforms and scissor lifts according to company policies and manufacturers' specifications
A-1.02.05	conduct inspection of access equipment according to safety checklist for defects such as leaking fluids and stress cracks in hoses
A-1.02.06	operate access equipment according to manufacturers' specifications
A-1.02.07	take down, organize and store access equipment in pre-designated area

Task 2 — Performs safety-related functions.

Context Insulators (heat and frost) use and maintain personal protective equipment (PPE) and safety equipment. Maintaining a safe work environment is crucial.

Required Knowledge

K 1	types of PPE such as eye protection, gloves, boots, respirators, hearing protection, fall arrest equipment and hard hats
K 2	types of safety equipment such as warning tapes, first aid kits and eye wash stations
K 3	PPE and safety equipment operation such as fire extinguisher operation
K 4	company policies and procedures such as evacuation routes, muster stations, warning signals, emergency phone numbers and location of safety equipment
K 5	federal, provincial/territorial and municipal health and safety acts and regulations such as OH&S and WHMIS
K 6	company or site-specific safety training requirements such as fall protection, confined space entry, hoisting and lock-out procedures
K 7	housekeeping practices according to company and site specific policies
K 8	safety watch requirements such as fire watch and man watch
K 9	work permit requirements such as confined space, hot work and safe work

Sub-task

A-2.01 Uses personal protective equipment (PPE) and safety equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-2.01.01	select PPE and safety equipment according to job requirements
A-2.01.02	verify PPE has been cleaned before each use
A-2.01.03	inspect and ensure PPE and safety equipment are in good working condition
A-2.01.04	remove and report unsafe, worn, damaged or defective PPE and safety equipment
A-2.01.05	recognize limitations of PPE and safety equipment
A-2.01.06	perform a positive and negative, or smoke field test before wearing a respirator
A-2.01.07	ensure fit test is up-to-date to accommodate changes in face structure such as facial hair, weight gain, broken nose or abscessed tooth
A-2.01.08	adjust PPE to ensure coverage and protection
A-2.01.09	store PPE and safety equipment in designated area

Sub-task

A-2.02 Maintains safe work environment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-2.02.01	visually check worksite for hazards such as pinch points, tripping hazards, chemical hazards and electric shock hazards
A-2.02.02	remove or mitigate hazards by covering a hot pipe to make the work area safe
A-2.02.03	report hazards or near misses immediately
A-2.02.04	lock out and tag out electrical equipment
A-2.02.05	ensure that apprentices are properly trained for task at hand
A-2.02.06	verify work permits required for the job such as safe work, hot work and confined space

A-2.02.07	comply with all regulations, policies and procedures in the workplace such as housekeeping, emergency and evacuation, disposal of materials, muster station, and fire watch and man watch requirements
A-2.02.08	set up barriers such as "caution" or "do not enter" tape to cordon off work area, and ensure tape is removed upon completion of work
A-2.02.09	perform a field level risk assessment of worksite for hazards such as pinch points, electrical shock hazards, and locate emergency eye wash and first aid stations

Task 3 — Organizes work.

Context Insulators (heat and frost) plan their daily tasks according to the job specifications. They organize the materials, tools and equipment for storage and easy retrieval.

Required Knowledge

K 1	safety and PPE requirements
K 2	daily and job deadlines
K 3	work to be done by other trades
K 4	sequence of task activities
K 5	work order, work release and safe work permit procedures
K 6	storage procedures such as labels facing out, and materials off the ground and protected from the elements
K 7	pre-designated areas for storing tools and materials
K 8	types, sizes and amounts of materials required for each job
K 9	job requirements and specifications

Sub-task

A-3.01 **Performs task scheduling.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-3.01.01	organize and prioritize daily tasks according to factors such as job requirements, safety considerations and field level risk assessments
A-3.01.02	determine work effort remaining according to job requirements
A-3.01.03	coordinate work tasks with other trades
A-3.01.04	determine tools and equipment required such as aerial platforms, scissor lifts and scaffolding according to job requirements, confirm their availability and reserve

Sub-task

A-3.02 **Organizes materials on site.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-3.02.01	sort and place material according to sequence of retrieval
A-3.02.02	store and secure material in designated area considering factors such as labels facing out, and materials off the ground and protected from the elements

Task 4 — Performs routine trade practices.

Context Insulators (heat and frost) interpret specifications and drawings to understand the job requirements. They calculate measurements, prepare substrates and apply sealants.

Required Knowledge

K 1	mathematical formulas such as basic geometry and converting decimals to fractions
K 2	imperial and metric systems and conversion from one to the other
K 3	types of drawings such as mechanical, architectural, structural and electrical
K 4	location of specifications and drawings
K 5	types of substrates on components such as tanks, ducts and pipes
K 6	substrate materials such as steel, copper and galvanized metal
K 7	thickness of the material to be applied
K 8	types of materials to be applied such as fireproofing, soundproofing and cement
K 9	compatibility of insulating material and substrate based on factors such as temperature ranges
K 10	PPE requirements such as face shields, respirators and hearing protection when preparing substrates and applying sealants
K 11	substrate preparation techniques for installation of insulation
K 12	types of protrusions, penetrations and irregularities in the substrate
K 13	work release procedures
K 14	types of fasteners such as pins and clips, wire and banding
K 15	types of sealants such as mastic, lagging, caulking and foil tape
K 16	application of sealants such as on cladding, cellular glass and polyvinyl chloride (PVC)
K 17	watershed requirements

Sub-task

A-4.01 Performs measurements and calculations.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-4.01.01	take field measurements using tools such as measuring tapes, chalk lines, squares and straight edges
A-4.01.02	calculate layout dimensions of components such as insulation, cladding/jacketing and removable covers using formulas such as for surface area, volume and circumference/diameter

Sub-task

A-4.02 Interprets specifications and drawings.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-4.02.01	read isometric drawings for factors such as directional orientation, line numbers, footage, number of fittings and thickness of insulation
A-4.02.02	identify symbols such as valves, fittings and tees found on blueprints
A-4.02.03	determine actual dimensions using tools such as a tri-scale
A-4.02.04	read drawing components such as scales, details, legends and elevations to determine job requirements
A-4.02.05	read job specifications to determine job requirements such as band spacing, types of coating and types of sealants

Sub-task

A-4.03 **Prepares substrates.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-4.03.01	clean substrate using tools and equipment such as a wire brush and scraper to ensure proper weld
A-4.03.02	grind and pin substrate using equipment such as mini-grinder and pin welder
A-4.03.03	remove sealant from surface using tools and equipment such as wire brush, scraper and knife to ensure a nice clean fit

Sub-task

A-4.04 **Applies sealants.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

A-4.04.01	determine sealant according to type of covering such as mastic, reinforced fibreglass mesh, aluminium cladding and stainless steel cladding
A-4.04.02	use sealant according to manufacturers' specifications using tools and equipment such as caulking gun and paint brush

Trends	Electrically-operated fabrication tools are becoming more available. There is an increased emphasis on safety in the industrial worksite, including safety orientations and increased documentation.
Related Components (including, but not limited to)	Boilers, piping, breeching, fittings, turbines, exhaust systems, hangers, precipitators, vessels, tanks, chillers, reactors, furnaces, ducts, heat exchangers, columns, instruments. **Materials:** seals, banding, wire, cladding, insulation, screws, rivets, pins and clips, studs, rails, fibre tape, expanded metal lath.
Tools and Equipment	Hand tools, power tools, layout tools, spray equipment, PPE and safety equipment.

Task 5 — Prepares for installation of insulation in industrial applications.

Context Insulators (heat and frost) prepare for installing insulation by selecting materials for use depending on the application. They develop a layout, which ensures proper fit and ease of installation.

Required Knowledge

K 1	types of pipe insulation such as fibreglass, urethane, ceramic fibre and mineral fibre
K 2	types of piping systems such as process, steam and cooling
K 3	pipe material such as copper, iron and stainless steel
K 4	pipe sizes
K 5	location and temperature range of piping
K 6	job and manufacturers' specifications
K 7	heat tracing such as steam and electric
K 8	multiple layer application
K 9	types of cladding material such as steel, stainless steel, aluminium and silicone cloth
K 10	layout methods such as radial line, parallel line and triangulation
K 11	fastening systems

K 12	types of removable covers such as pads, blankets and metal boxes
K 13	basic mathematics and geometry
K 14	charts such as mitre, cladding and thermal expansion
K 15	sizes and amounts of materials required for each job

Sub-task

B-5.01 Selects materials for industrial applications.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-5.01.01	determine the various components that require insulation according to job specifications
B-5.01.02	determine types, sizes and thickness of insulation depending on temperature range, mechanical use and equipment size
B-5.01.03	determine materials needed to match existing work or surfaces on renovation and maintenance work
B-5.01.04	determine types and sizes of cladding depending on factors such as reaction to other materials that are in contact with the cladding and finished size of insulation
B-5.01.05	calculate amount of insulation and cladding required to ensure adequate supply and reduce waste
B-5.01.06	determine fastening system depending on type of installation

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Sub-task

B-5.02 Performs layout for industrial applications.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-5.02.01	draw field sketches based on installation requirements
B-5.02.02	set up work area large enough to accommodate layout
B-5.02.03	calculate machinery allowances such as laps, lock-formed seams and easy edges to ensure coverage

B-5.02.04	develop layout using tools such as dividers, squares, tape measures and calculator based on calculated dimensions
B-5.02.05	mark layout using tools such as scratch awls and markers to transfer measurements to template
B-5.02.06	create template by cutting out layout

Task 6 — Insulates piping and fittings.

Context Insulators (heat and frost) insulate piping and fittings to prevent thermal transmission and to provide personnel protection. Proper fit of insulation around pipes, fittings and hangers is essential to the safe, efficient and cost effective operation of the industrial process.

Required Knowledge

K 1	types of pipe fittings such as valves, tees and transitions
K 2	types of elbows such as 90°, 45°, long radius, short radius and sweeps
K 3	types of hangers such as shoes, sleeves and clevises
K 4	types of pipe insulation such as fibreglass, calcium silicate, cellular glass, urethane and mineral fibre
K 5	hazards associated with various types of insulation
K 6	fastening methods such as wire, banding and tape
K 7	pipe specifications such as outside diameter and operating temperature
K 8	insulation application techniques
K 9	expansion and contraction joint fabrication
K 10	possible results of poor fitting pipe insulation such as energy loss, frost build-up and personal injury (burns from excess heat or frost)
K 11	oversize piping installation methods for traced pipe
K 12	sizes and amounts of materials required for each job

Sub-task

B-6.01 **Installs insulation on piping, fittings and hangers.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-6.01.01 fabricate insulation according to measurements and hanger accommodation

B-6.01.02 fabricate components such as elbows and tees by measuring, cutting and assembling according to job requirements

B-6.01.03 secure insulation using fasteners such as wire, bands, adhesive and tape, and according to factors such as insulation type, thermal expansion, mechanical vibration and job specifications

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Sub-task

B-6.02 **Applies vapour barrier on piping and fittings.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-6.02.01 measure and cut vapour barrier using tools such as tape measures, knives, scissors and snips, according to size of insulation

B-6.02.02 wrap insulated pipe with vapour barrier material, while accommodating for hangers, valves and elbows

B-6.02.03 apply adhesives and tapes to seams and joints to ensure integrity of the vapour barrier

B-6.02.04 trowel and paint vapour barrier onto insulation according to application ensuring the integrity of the seal

Task 7 — Insulates tanks, vessels and equipment.

Context Insulators (heat and frost) insulate tanks, vessels and equipment, including instrumentation, to regulate temperature and prevent condensation. Tanks include crude oil, liquefied natural gas and asphalt tanks. Vessels are pressurized and include desalters, aerators and crackers. Equipment includes boilers, pumps, reactors and columns/towers.

Required Knowledge

K 1	types of insulation such as fibreglass, cellular glass and mineral fibre
K 2	types of tanks such as crude oil, liquefied natural gas and asphalt tanks
K 3	types of vessels such as desalters, aerators and crackers
K 4	types of equipment such as boilers, pumps and turbines
K 5	hazards associated with various types of insulation
K 6	manufacturers' specifications for insulation and equipment
K 7	basic geometry such as area and circumference
K 8	tank, vessel and equipment expansion and contraction
K 9	importance of tight fitting insulation
K 10	insulation specifications
K 11	lifting equipment such as pulley systems
K 12	fastening methods such as pins, studs and rails, banding and hexagonal wire mesh
K 13	tank and vessel specifications such as location of pins and studs, and types and spacing of banding
K 14	sizes and amounts of materials required for each job

Sub-task

B-7.01 **Installs insulation on tanks, vessels and equipment.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-7.01.01 cut insulation according to measurements and penetration accommodation using tools such as hand saws, knives, dividers and tape measures

B-7.01.02 fabricate components such as head segments and manways by measuring, and cutting using tools such as band saws, hand saws, knives, dividers and tape measures according to job requirements

B-7.01.03 assemble components on large scale equipment using rubber bands to hold insulation in place for fastening

B-7.01.04 fasten insulation with chokers, bands, adhesives and tapes using tools such as end nippers and band tensioners according to insulation type, thermal expansion, mechanical vibration and job specifications

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Sub-task

B-7.02 **Applies vapour barrier on tanks, vessels and equipment.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-7.02.01 measure and cut vapour barrier using tools such as tape measures, knives and scissors according to size of insulation to fit barrier over top of insulation

B-7.02.02 wrap vapour barrier around insulation and apply adhesive according to manufacturers' specifications

B-7.02.03 trowel and paint vapour barrier onto insulation according to application while ensuring the integrity of the seal

B-7.02.04 tape seams of insulation with foil tape according to manufacturers' specifications

Task 8 — Installs protective cladding.

Context Insulators (heat and frost) install protective cladding to protect insulation from weather and mechanical abuse. It is also used to enhance the appearance. Fabrication and installation of cladding is a very technical part of an insulator's work. Cladding is a trade term that may also be called jacketing when installed over piping, tanks and vessels.

Required Knowledge

K 1	types of cladding material such as coated steel (galvanized), stainless steel, PVC and aluminium
K 2	location of application
K 3	watershed requirements
K 4	types of components such as sheets, expansion rings, head segments, gores, and vessel and tank heads
K 5	types of cladding such as corrugated, flat stock and embossed
K 6	specifications such as spacing of screws and bands, and horizontal and vertical laps
K 7	fastening components such as S and U clips, bands, seals and springs
K 8	sizes and amounts of materials required for each job

Sub-task

B-8.01 Fabricates cladding components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-8.01.01	cut cladding using tools such as circular saws, power shears, slitter and foot operated shears (guillotine) according to measurements
B-8.01.02	mark and cut out components such as head segments, gores and tees according to template created from layout
B-8.01.03	shape components such as head segments, gores, tees and end caps using tools such as combination machines (beaders/crimpers), lockformers, brakes and rollers
B-8.01.04	create safety edges on cladding by using metal brakes to prevent sharp edges and add strength

Sub-task

B-8.02 **Assembles cladding components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-8.02.01	determine watershed to prevent moisture penetration
B-8.02.02	determine starting position for tank cladding and tank heads according to factors such as watershed, wind direction and material design
B-8.02.03	modify fabricated cladding, in the field, to accommodate cut outs
B-8.02.04	match and level edges and corrugations on sheet cladding for a tighter seal and aesthetic appearance

Sub-task

B-8.03 **Fastens cladding components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

B-8.03.01	space fasteners according to application and engineering specifications
B-8.03.02	position fasteners to ensure level, square and uniform
B-8.03.03	tighten and secure fasteners using tools such as screwdrivers, band tensioners and hammers

BLOCK C — COMMERCIAL APPLICATIONS

Trends

Due to the rising energy costs, insulation in commercial applications is becoming more prevalent. Some new, easier to use materials such as self-sealing PVC jacketing are appearing on the market.

Related Components (including, but not limited to)

Mechanical and plumbing systems: piping, tanks, pumps, fittings, hangers, boilers, heat exchangers, chillers, refrigeration systems, breechings, mufflers, vessels, duct work, plenums, fan housings.

Insulation materials: fibreglass, mineral fibre, elastomeric insulation, polystyrene, urethane, canvas, corner beads, aluminium, PVC, stainless steel, lead sheeting, barium, removable covers, foil scrim (foil skin).

Fastening materials: staples, glue, banding, seals, pins, clips, contact adhesives, cements, screws, lagging, tape, twine, wire, hexagonal wire mesh, mastic, self-seal laps.

Tools and Equipment

Hand tools, power tools (pin welders, drills, heat guns, grinders), layout tools, spray equipment, PPE and safety equipment.

Task 9 — Prepares for installation of insulation in commercial applications.

Context

Commercial systems are insulated for a variety of reasons such as condensation prevention, energy saving, personnel protection or soundproofing. Therefore, knowledge of the different insulating materials and their applications is important to achieve desired result.

Commercial systems incorporate a variety of irregular-shaped components such as pipes, ducts and equipment; therefore, it is important for the insulator (heat and frost) to perform layout for different patterns.

Required Knowledge

K 1	plumbing systems such as cold and hot water, recirculation systems and rainwater leaders
K 2	mechanical systems and equipment such as heating, ventilation, and air conditioning (HVAC), cooling, refrigeration, pumps, fans, boilers and chillers
K 3	types of insulation such as fibreglass, mineral fibre, elastomeric insulation, insulation cement, rigid board and flexible blankets/batts
K 4	job, jurisdictional, site and manufacturers' specifications

K 5	adhesives and fasteners
K 6	types of protective finishes such as PVC, stainless steel, aluminium, canvas and cement
K 7	types and importance of vapour barriers such as reinforced foil flame retardant kraft (RFFRK), mastics, all service jacket (ASJ) and primer membrane barriers (PMB)
K 8	fitting layout
K 9	basic geometry and arithmetic
K 10	hazards of materials and location
K 11	sizes and amounts of materials required for each job

Sub-task

C-9.01 Selects materials for commercial applications.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-9.01.01	determine the various components of plumbing and mechanical systems that require insulation according to job specifications
C-9.01.02	determine type and size of insulation depending on temperature range, mechanical use and equipment size
C-9.01.03	determine materials needed to match existing work or surfaces on renovation and maintenance work
C-9.01.04	calculate the amount of materials needed to accomplish job such as insulation, protective finishes, fittings, vapour barriers, soundproofing materials, fasteners and sealants according to blueprints and job specifications

Sub-task

C-9.02 Performs layout for commercial applications.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-9.02.01	draw field sketches based on installation requirements
C-9.02.02	set up work area large enough to accommodate layout
C-9.02.03	develop patterns for components such as tees, valves and elbows using tools such as dividers, squares, tape measures and calculator based on calculated dimensions
C-9.02.04	mark layout using tools such as scratch awls and markers to transfer measurements to materials
C-9.02.05	create template by cutting out layout

Task 10 Insulates plumbing systems and mechanical piping.

Context Insulators (heat and frost) insulate plumbing systems such as domestic hot and cold water, and rainwater leaders. Mechanical piping includes steam, condensate, heating lines and chilled water. They are insulated for thermal, freeze protection and condensation as well as for personnel safety.

Required Knowledge

K 1	plumbing systems such as hot, cold, recirculation water, rainwater leaders and vent piping
K 2	mechanical piping systems such as heating, chilled water and refrigeration
K 3	piping components such as valves, tees, elbows and reducers
K 4	types of insulation such as fibreglass, elastomeric insulation and mineral fibre
K 5	layout angles
K 6	vapour barrier requirements
K 7	types and importance of vapour barriers such as ASJ, RFFRK, PMB and mastics
K 8	fastening devices and techniques
K 9	job specifications

K 10	types of protective finishes such as PVC, stainless steel, aluminium, canvas, lagging, foil scrim (foil skin) and cements as well as their properties and applications
K 11	pre-formed products such as PVC fittings and metal elbows
K 12	installation requirements such as watershed and lap placement
K 13	fitting layout
K 14	sizes and amounts of materials required for each job

Sub-task

C-10.01 Installs insulation on plumbing systems and mechanical piping.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-10.01.01	cut pre-formed and flexible insulation according to measurements to accommodate hangers, valves and elbows using tools such as knives and saws
C-10.01.02	secure insulation to piping system using fasteners such as self-seal laps, tape, wire, banding and staples

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Sub-task

C-10.02 Applies vapour barrier on insulated plumbing systems and mechanical piping.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-10.02.01	cut vapour barrier material using tools such as knives, scissors and snips
C-10.02.02	wrap insulated pipe and seal vapour barrier, while accommodating for hangers, valves and elbows
C-10.02.03	apply adhesives and tapes to seams and joints to ensure integrity of the seal
C-10.02.04	create vapour barrier by rolling, brushing, trowelling and spraying mastics, adhesives and paints

Sub-task

C-10.03 **Installs protective finishes on insulated plumbing systems and mechanical piping.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-10.03.01	cut and shape protective finishes such as ASJ, stainless steel, aluminium, PVC and canvas to fit the installed insulation, using tools and equipment such as beaders/crimpers, rollers and snips
C-10.03.02	secure protective finishes to installed insulation using fasteners such as lagging, screws, banding, PVC glue, tacks and tape
C-10.03.03	apply and shape cement to match contour of the pipe

Task 11 Insulates mechanical ducting.

Context Insulators (heat and frost) insulate mechanical ducting used in HVAC systems for thermal application and to prevent condensation. Application of a vapour barrier is critical in air conditioning systems.

Required Knowledge

K 1	mechanical HVAC systems
K 2	types of insulation such as fibreglass, rigid board and flexible blankets/batts
K 3	layout angles
K 4	vapour barrier requirements
K 5	types and importance of vapour barriers such as ASJ, RFFRK, tar paper and mastics
K 6	fastening devices and techniques
K 7	job specifications
K 8	types of protective finishes such as PVC, stainless steel, aluminium, canvas, lagging, foil scrim (foil skin) and cements as well as their properties and applications
K 9	installation requirements such as watershed and lap placement
K 10	sizes and amounts of materials required for each job

Sub-task

C-11.01 Installs insulation on mechanical ducting.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-11.01.01	cut rigid and flexible insulation according to measurements to accommodate hangers, reducers, transitions, tees and elbows using tools such as knives and saws
C-11.01.02	score insulation to allow for bends and curves in ducting
C-11.01.03	secure rigid and flexible insulation to mechanical ducting using fasteners such as pins, clips, foil tape, banding, staples and wire

Sub-task

C-11.02 Applies vapour barrier on insulated mechanical ducting.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-11.02.01	cut vapour barrier material using tools such as knives, scissors and snips
C-11.02.02	wrap insulated duct with vapour barrier material, while accommodating for hangers, transitions, reducers, tees and elbows
C-11.02.03	apply adhesives and tape to seams and joints to ensure integrity of the seal
C-11.02.04	create vapour barrier by rolling, brushing, trowelling and spraying mastics, adhesives and paints

Sub-task

C-11.03 Installs protective finishes on insulated mechanical ducting.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-11.03.01 cut and shape protective finishes such as RFFRK, stainless steel, aluminium, PVC and canvas to fit installed insulation, using tools and equipment such as snips, lockformers and brakes

C-11.03.02 secure protective finishes to installed insulation using fasteners such as lagging, screws, banding, PVC glue, tacks, tape and wire

Task 12 Insulates mechanical equipment.

Context Mechanical equipment includes hot water tanks, boilers, pumps, chillers and condensate tanks. They are insulated for thermal integrity and prevention of condensation. Protective coverings are also used in the insulation of mechanical equipment.

Required Knowledge

K 1 mechanical equipment such as pumps, fans, tanks, boilers and chillers

K 2 types of insulation such as fibreglass, rigid board, elastomeric insulation and flexible blankets/batts

K 3 layout angles

K 4 vapour barrier requirements

K 5 types and importance of vapour barriers such as ASJ, RFFRK, tar paper and mastics

K 6 fastening devices and techniques

K 7 job specifications

K 8 types of protective finishes such as PVC, stainless steel, aluminium, canvas, lagging and cements as well as their properties and applications

K 9 installation requirements such as watershed and lap placement

K 10 sizes and amounts of materials required for each job

Sub-task

C-12.01 Installs insulation on mechanical equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-12.01.01	cut rigid and flexible insulation according to measurements to accommodate irregular surfaces, protrusions, penetrations and hangers using tools such as knives and saws
C-12.01.02	cut lags and score insulation to allow for bends and curves in equipment
C-12.01.03	secure rigid and flexible insulation to mechanical equipment using fasteners such as pins and clips, foil tape, banding and staples

Sub-task

C-12.02 Applies vapour barrier on insulated mechanical equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-12.02.01	cut vapour barrier material using tools such as knives, scissors and snips
C-12.02.02	wrap insulated equipment with vapour barrier material, while accommodating for irregular shapes, protrusions, penetrations and hangers
C-12.02.03	apply adhesives and tape to seams and joints to ensure integrity of the seal
C-12.02.04	create vapour barriers by rolling, brushing, trowelling and spraying mastics, adhesives and paints

Sub-task

C-12.03 Installs protective finishes on insulated mechanical equipment.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

C-12.03.01	cut and shape protective finishes such as RFFRK, stainless steel, aluminium, PVC and canvas to fit installed insulation, using tools and equipment such as beaders/crimpers, snips, lockformers and brakes
C-12.03.02	secure protective finishes to installed insulation using fasteners such as lagging, screws, banding, PVC glue, tacks and tape

Trends	Due to safety concerns about lead, there have been changes in soundproofing materials. Furthermore, some job sites have banned the use of lead. Safety is becoming a higher priority within the industry. Safer materials such as barium-impregnated rubber are appearing on the market.
Related Components (including, but not limited to)	Boilers, precipitators, piping, breeching, fittings, turbines, vessels, tanks, chillers, reactors, furnaces, ducts, heat exchangers, plenums, columns, instruments. **Materials:** cladding, insulation, removable covers, acoustic panels, lead, barium, fibreglass, mineral fibre, refractory cement, polyurethane, cellular glass.
Tools and Equipment	Hand tools, power tools, layout tools, spray equipment, PPE and safety equipment.

Task 13 Installs insulation systems for refractory and cryogenic applications.

Context Insulators (heat and frost) apply insulating materials in refractory (above +815°C/1500°F) and cryogenic (below -101°C/-150°F) applications. The insulation must be properly installed in order to prevent heat or cold loss. Proper fitting insulation in cryogenic applications is crucial to prevent ice build-up and system failure. Proper fitting insulation in refractory applications is crucial to prevent burns and system failure.

Required Knowledge

K 1	types of refractory insulation systems such as castable and cavity
K 2	temperature range of refractory application
K 3	location to be insulated
K 4	application methods such as trowelling, pouring and spraying
K 5	expansion and contraction of joints
K 6	procedures for elimination of thermal shock
K 7	types of cryogenic insulation systems such as rigid insulation and multi-layered construction

K 8	types of vapour barriers such as metal, sealants and low temperature self-adhesive membranes
K 9	temperature range of cryogenic applications
K 10	importance of accurate measurements in cryogenic applications
K 11	expansion rate of foam
K 12	job, engineering and manufacturers' specifications such as for securement and for thermal bridging of hangers and other protrusions
K 13	protective finishes such as aluminium, PVC and stainless steel jacketing/cladding
K 14	sizes and amounts of materials required for each job

Sub-task

D-13.01 Applies insulation to refractory systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-13.01.01	cut insulation such as calcium silicate and ceramic fibre using tools such as saws and knives
D-13.01.02	install insulation with staggered joints to improve the efficiency of the installation
D-13.01.03	fasten insulation using wire and banding
D-13.01.04	build expansion joints at specified intervals using slip joints and different densities of insulation
D-13.01.05	trowel refractory cement onto inside walls of boilers, incinerators and crucibles

Sub-task

D-13.02 Applies insulation to cryogenic systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-13.02.01	cut insulation such as cellular glass, polyurethane and polystyrene using tools such as hand saws and knives
D-13.02.02	install insulation with staggered joints to improve the efficiency of the installation
D-13.02.03	apply mastic on the seams of insulation such as cellular glass, polyurethane and polystyrene to ensure integrity of the vapour barrier
D-13.02.04	secure insulation using fasteners such as filament tape and banding
D-13.02.05	build contraction joints at specified intervals using slip joints and different densities of insulation

Sub-task

D-13.03 Applies vapour barrier to insulated components of cryogenic systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-13.03.01	cut vapour barrier material using tools such as knives, scissors and snips
D-13.03.02	wrap insulated pipe with vapour barrier material, while accommodating for hangers, valves and elbows
D-13.03.03	apply adhesives and tape to seams and joints to ensure integrity of the seal
D-13.03.04	create vapour barrier by rolling, brushing, trowelling and spraying mastics, adhesives and paints

Sub-task

D-13.04 **Installs reflective and protective jacketing.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-13.04.01	cover insulated components in refractory applications with reflective jacketing such as aluminium, stainless steel and foil scrim (foil skin) to help in heat loss prevention and improve system efficiency
D-13.04.02	cover insulated components in cryogenic applications with jacketing such as aluminium, stainless steel and PVC to provide protection of insulation system
D-13.04.03	secure jacketing using fasteners such as screws, banding and adhesives

Task 14 Installs underground insulating systems.

Context Underground systems are used for convenience and aesthetics, and to transfer products for heating and process piping. Insulators (heat and frost) use various methods to insulate the piping.

Required Knowledge

K 1	types of pipe insulation such as cellular glass, urethane and fibreglass
K 2	types of insulation jacketing for underground systems such as asphalt-based membrane, fibreglass cloth and resin
K 3	expansion and contraction of pipe
K 4	types of pour-in-place granular insulation
K 5	trenching
K 6	procedures for working in confined spaces
K 7	sizes and amounts of materials required for each job

Sub-task

D-14.01 Installs pipe insulation to underground systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-14.01.01	cut pre-formed and flexible insulation using tools such as knives and saws, according to measurements to accommodate pipe supports, valves and elbows
D-14.01.02	secure insulation to piping system using fasteners such as self-seal laps, tape, wire, banding and staples
D-14.01.03	apply mastics and protective membranes to keep out moisture and dirt

Sub-task

D-14.02 Installs pour-in-place insulation to underground systems.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-14.02.01	apply polyethylene film to forms in trench using securement methods such as adhesives and staples
D-14.02.02	fill trench with pour-in-place insulation to proper density using vibration and compaction equipment

Task 15 Insulates for soundproofing.

Context Insulation is often applied to industrial/commercial piping and equipment solely for the purpose of sound suppression. Some commercial soundproofing applications include recording studios, movie theatres, hotels and mechanical rooms.

Required Knowledge

K 1	basics of sound transmission
K 2	types of piping requiring soundproofing such as natural gas, high pressure steam and process piping
K 3	industrial components requiring soundproofing such as turbines, pumps and induction fans
K 4	types of soundproofing materials such as fibreglass, ceramic fibre, mineral fibre, lead and barium
K 5	types of acoustic materials such as rigid fibreglass board and spacer bars
K 6	types of jacketing such as aluminium and stainless steel
K 7	hazards of working with natural gas piping and equipment such as extreme noise and heat, moving parts, and working with lead
K 8	layout of fasteners such as pin placement
K 9	fasteners such as banding, wire and filament tape
K 10	properties of acoustic materials
K 11	job specifications
K 12	air space requirements
K 13	support systems for hanging acoustic systems
K 14	application techniques
K 15	sizes and amounts of materials required for each job

Sub-task

D-15.01 Insulates piping for soundproofing.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-15.01.01	cut pre-formed and flexible insulation using tools such as knives and saws according to measurements to accommodate hangers, valves and elbows
D-15.01.02	secure insulation to piping system using fasteners such as self-seal laps, tape, wire, banding and staples
D-15.01.03	install sound deadening materials such as lead sheeting, barium-impregnated materials and gypsum board to wrap or cover insulated pipe
D-15.01.04	apply finish material such as aluminium, stainless steel and PVC jacketing

Sub-task

D-15.02 Insulates turbines and equipment for soundproofing.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-15.02.01	cut rigid and flexible insulation using tools such as knives and saws according to measurements to fit irregular shapes of turbines and equipment
D-15.02.02	secure insulation using methods such as pin welding, banding, wiring and using hexagonal wire mesh
D-15.02.03	install sound deadening materials such as lead sheeting, barium-impregnated materials and gypsum board to wrap or cover insulated turbines and equipment
D-15.02.04	apply finishes such as aluminium, cement and fibreglass cloth

Sub-task

D-15.03 Insulates mechanical systems for soundproofing.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-15.03.01	cut acoustic materials such as rigid board and flexible acoustic liners to fit interior of plenum and related ducting
D-15.03.02	secure acoustic material using fasteners such as pins (glued or welded) and adhesives
D-15.03.03	seal seams with mastic and fabric to ensure material integrity

Sub-task

D-15.04 Fabricates acoustic panels.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

D-15.04.01	build support structure for panelling
D-15.04.02	fill and fasten acoustic material to the support structure
D-15.04.03	finish using materials such as vinyls, fabrics, mastics and metals according to specifications

Sub-task

D-15.05 **Installs acoustic panels to ceilings and walls.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

D-15.05.01 secure acoustic panels to walls and ceilings with fasteners such as cup pins and adhesives

D-15.05.02 suspend acoustic panels from walls and ceilings with hangers, leaving air spaces, according to job and manufacturers' specifications

Task 16 Installs removable covers.

Context Removable covers are used to minimize heat loss and protect personnel. They also provide access to fittings and equipment for maintenance or inspection. Insulators (heat and frost) are responsible for the layout and fabrication of the covers, usually in a shop environment. They also must fit and fasten the covers in the field.

Required Knowledge

K 1 types of removable pad insulation such as fibreglass blankets, ceramic fibre blankets, steel knit mesh and silicone cloth

K 2 types of insulation for metal boxes such as rigid fibreglass, mineral fibre, polystyrene and polyurethane

K 3 sequence of assembling components

K 4 uses of removable covers

K 5 types of removable covers such as pads, blankets and metal boxes

K 6 basic mathematics and geometry

K 7 securement methods

K 8 sizes and amounts of materials required for each job

Sub-task

D-16.01 Fabricates removable covers.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-16.01.01	draw field sketches based on type of installation
D-16.01.02	layout covers making allowances for laps, lock-formed seams and easy edges, using tools such as dividers, scratch awls, levels, tape measures, trammel points and squares
D-16.01.03	fabricate soft covers using tools such as hog ring pliers, stitch staplers and sewing machines
D-16.01.04	install fastening devices for soft covers such as lacing anchors, D-rings, hook and loop, and draw strings
D-16.01.05	fabricate hard covers using tools such as brakes, lockformers and easy edgers
D-16.01.06	secure and seal insulation in metal boxes
D-16.01.07	install fastening devices for hard covers such as rivets, suitcase latches and screws

Sub-task

D-16.02 Fastens removable covers.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

D-16.02.01	modify covers in the field to fit equipment and fittings
D-16.02.02	secure covers using fastening systems such as lacing anchors, hook and loop, draw strings and suitcase latches

BLOCK E — DISTINCTIVE APPLICATIONS

Trends	Updated regulations require fire stopping and fireproofing installation. New marine insulating materials such as polyimide foam are now being used because of their sound absorption and water resistant qualities.
Related Components (including, but not limited to)	Turbines, tanks, refrigerators, structural steel, decking, piping, bulkheads, vessels, ducting, breechings, buildings. **Materials:** mineral fibre, ceramic fibre, calcium, polyurethane, cement, fibreglass, cellulose fibre, hexagonal wire mesh, metal lath, fasteners.
Tools and Equipment	Spray equipment, hand tools, power tools, PPE and safety equipment.

Task 17 — Sprays sealers, coatings and spray-on insulation.

Context Spray insulation can be used for a variety of purposes including thermal integrity, fire protection and soundproofing. Preparation of materials and the surrounding work area must be done before spraying begins.

Required Knowledge

K 1	substrate limitations
K 2	materials to be sprayed such as polyurethane, cellulose fibre, sealants, coatings and mastics
K 3	hazards and required PPE
K 4	specifications such as thickness of material, number of layers, density and required finish
K 5	locations of finished products such as electrical panels, machinery and existing finished surfaces
K 6	types of material used to protect surfaces such as drop cloths, fire blankets and polyethylene
K 7	spray pressure to be used
K 8	maintenance of spray equipment
K 9	equipment to be used for spraying
K 10	cleaning materials such as tri-sodium phosphate (TSP), methyl ethyl keytone (MEK) and methyl hydrate

K 11	procedures and ratios for mixing material
K 12	temperature condition of substrate
K 13	curing times and ambient conditions
K 14	expansion rates for polyurethane

Sub-task

E-17.01 Protects surrounding work area for spraying.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

E-17.01.01	cover air vents, piping, electrical panels and trays, and finished products to prevent overspray
E-17.01.02	overlap and tape protective sheeting to secure

Sub-task

E-17.02 Prepares material, equipment and substrate for spraying.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

E-17.02.01	assemble spray equipment
E-17.02.02	inspect substrate for readiness considering factors such as temperature, deficiencies and cleanliness
E-17.02.03	clean and prime substrate to ensure adhesion of spray material
E-17.02.04	mix materials and load hoppers according to manufacturers' specifications

Sub-task

E-17.03 Installs reinforcing material for spraying.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

E-17.03.01	lay out anchor points in order to fasten reinforcing materials in place
E-17.03.02	fasten and secure anchors using techniques such as pin welding, bonding and self-adhering
E-17.03.03	attach reinforcing materials to anchors using wires and clips/washers

Sub-task

E-17.04 Applies spray insulation, coatings and sealers.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

E-17.04.01	operate spray equipment such as airless, two-part guns and hoppers
E-17.04.02	spray material evenly applying multiple layers as required to achieve thickness according to job specifications
E-17.04.03	apply patch coats as required to cover deficiencies
E-17.04.04	knock down/tamp cellulose fibre to required density according to job specifications

Task 18 Installs fire stop systems.

Context Fire stopping is designed to compartmentalize fire to one area so that it is easily contained. It is applied to the structure, building and structural penetrations. It acts as a smoke seal to prevent noxious fumes and smoke from spreading to adjacent areas.

Required Knowledge

K 1	engineering specifications
K 2	purpose of fire stops and fire stop coverings
K 3	fire stop products such as self-levelling caulking, firebrick, ceramic cloth, endothermic materials, and intumescent putty, caulking, strips and collars
K 4	responsibility of stakeholders such as building owners, engineers, architects and general contractors
K 5	types of fire stop finishes such as concrete, two-part water-based mastics and metal
K 6	jurisdictional regulations and building codes
K 7	exposed and concealed mechanical systems
K 8	sizes and amounts of materials required for each job

Sub-task

E-18.01 Applies fire stop materials to structural, electrical and mechanical components.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

E-18.01.01	calculate materials needed according to fire stop system specifications
E-18.01.02	fill voids such as abutments, joints, wall and floor penetrations with damming materials such as mineral wool and ceramic fibre
E-18.01.03	wrap, stuff, spray and trowel material around structural, electrical and mechanical components according to material type
E-18.01.04	cut materials using tools such as jig saws, snips and knives
E-18.01.05	fasten fire stop materials using tools such as band tensioners, powder-actuated tools, drills and pin welders

Sub-task

E-18.02 **Protects fire stop materials.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

E-18.02.01	cut and fabricate protective covering according to job specifications
E-18.02.02	position and fasten protective covering over fire stop using fasteners such as screws, rivets, banding and adhesives
E-18.02.03	seal seams using sealers such as fire tape and caulking

Task 19 Installs fireproofing.

Context Fireproofing is applied to structural components such as beams, shafts and decking to prolong the steel's integrity.

Required Knowledge

K 1	structural components to be fireproofed such as legs on vessels, beams, skirts and hangers
K 2	types of fireproofing systems such as sprayed, trowelled and poured-in-place
K 3	materials such as mineral fibre, cellulose fibre and aluminium silica
K 4	multi-layer application technique
K 5	job and manufacturers' specifications
K 6	electrical components to be fireproofed such as cable trays and conduits
K 7	jurisdictional regulations and building codes
K 8	sizes and amounts of materials required for each job

Sub-task

E-19.01 **Applies fireproofing to structural, electrical and mechanical components.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

E-19.01.01	calculate materials needed according to fire proof system specifications
E-19.01.02	prepare materials such as cement and cellulose fibre according to manufacturers' specifications
E-19.01.03	fill voids such as abutments, joints, wall and floor penetrations with damming materials such as mineral wool and fibreglass
E-19.01.04	wrap, stuff, spray and trowel material around structural, electrical and mechanical components according to material type
E-19.01.05	cut materials using tools such as jig saws, snips and knives
E-19.01.06	fasten fireproof materials using tools such as band tensioners, powder-actuated tools, drills and pin welders

Sub-task

E-19.02 **Protects fireproofing materials.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

E-19.02.01	cut and fabricate protective covering according to job specifications
E-19.02.02	position and secure protective covering over fireproof material using fasteners such as screws, rivets, adhesives and banding
E-19.02.03	seal seams using sealers such as fire tape and caulking

Task 20 — Insulates for marine applications. (NOT COMMON CORE)

Context Bulkheads, deckheads and hulls in marine applications may be insulated for thermal integrity, fire proofing and noise suppression. Insulators (heat and frost) also work on piping, ducting, fire stopping and exhaust pipes on marine applications. These activities are identical to other industrial activities already detailed in this document.

Required Knowledge

K 1	insulating materials such as mineral fibre, fibreglass, fabric-faced insulation and polyimide foam
K 2	pin and clip fastening systems
K 3	multi-layer application of insulation
K 4	sequence of application of insulation
K 5	marine approved materials
K 6	hazards associated with marine applications such as confined spaces, epoxies and paints
K 7	types of finish material such as perforated metal, RFFRK, fabric finish system, aluminium and steel
K 8	stud and rail system for installing finish material over insulation
K 9	sequence of application of finish materials
K 10	sizes and amounts of materials required for each job

Sub-task

E-20.01 Insulates bulkheads, deckheads and hulls. (NOT COMMON CORE)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	no	no	yes	NV	NV	NV

Key Competencies

E-20.01.01	cut insulation using tools such as hand saws, knives, dividers and tape measures, according to measurements and penetration, protrusion and irregular shape accommodation
E-20.01.02	paint around welded pins to prevent corrosion

E-20.01.03	position and assemble components for fastening
E-20.01.04	fasten insulation with pins and clips, chokers and bands according to insulation type, thermal expansion, mechanical vibration and job specifications

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Sub-task

E-20.02 **Installs finish material for marine applications. (NOT COMMON CORE)**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	no	no	yes	NV	NV	NV

Key Competencies

E-20.02.01	apply tape to seam of fabric-faced board (navy board) and RFFRK to finish
E-20.02.02	wrap and fasten fibreglass cloth to piping using lagging
E-20.02.03	apply top coat of lagging to fibreglass cloth to seal pores
E-20.02.04	applies protective perforated metal finish over insulation

BLOCK F — ASBESTOS ABATEMENT

Trends	Removal of asbestos has become more prevalent than enclosure or encapsulation. There has been an increase in the enforcement of regulations governing the removal of asbestos. There is greater awareness of hazards of working around material containing asbestos.
Related Components (including, but not limited to)	Piping, furnaces, boilers, tanks, vessels, turbines, breeching, walls, ceilings, ships, precipitators.
Tools and Equipment	Hand tools, negative air machines, HEPA vacuums, spray equipment, PPE and safety equipment.

Task 21 — Prepares for asbestos abatement.

Context Because of the severe health risks associated with asbestos-related products, any potential for airborne contamination must be mitigated. Extreme precautions must be taken in preparation for removal or encapsulation of asbestos.

Required Knowledge

K 1	rules and regulations governing asbestos abatement
K 2	asbestos products such as crocidolite, amosite and chrysotile
K 3	classifications of asbestos abatement such as type I, II and III to determine risk factors
K 4	testing facilities
K 5	containment devices for asbestos samples
K 6	personnel requirements
K 7	rules and regulations governing the use of PPE for asbestos abatement
K 8	types of PPE such as HEPA filters, gloves and disposable coveralls
K 9	decontamination requirements for PPE used with asbestos
K 10	rules and regulations for asbestos removal or containment sites
K 11	required materials such as disposal containers, ties, wires and duct tape
K 12	access to utilities such as water and electricity

K 13	rules and regulations for temporary enclosures such as required overlap, double doors and ventilation requirements
K 14	types of temporary enclosures such as glove bags and asbestos hoarding (bubble)
K 15	required number of negative air machines and their locations
K 16	backup requirement for negative air machines
K 17	materials used for temporary enclosure such as studs and polyethylene
K 18	rules and regulations governing disposal of asbestos and other products, such as disposable coveralls, filters and gloves
K 19	disposal procedures such as double bagging and labelling
K 20	decontamination set up
K 21	sizes and amounts of materials required for each job

Sub-task

F-21.01 **Determines required personal protective equipment (PPE) for asbestos abatement.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

F-21.01.01	determine level of risk based on the classification of asbestos abatement
F-21.01.02	select PPE such as type of respirator, disposable coveralls, gloves and disposable booties based on classification of asbestos abatement

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Sub-task

F-21.02 **Retrieves sample of asbestos for testing.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

F-21.02.01	treat all bulk samples as positive for asbestos until proven different
F-21.02.02	isolate area from public access while taking sample
F-21.02.03	take sample using sampling tools such as glove bags and hand tools while minimizing disturbance to the sample to avoid making the asbestos friable

F-21.02.04 document sampling information such as date and time taken, line number and who took the sample

F-21.02.05 apply temporary seal to encapsulate location from where sample was taken

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Sub-task

F-21.03 Determines scope of work.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

F-21.03.01 determine amount of asbestos to be removed, enclosed or encapsulated

F-21.03.02 assess level of risk based on the classification of asbestos abatement

F-21.03.03 select materials required for abatement such as polyethylene, wooden studs and duct tape

F-21.03.04 select tools and safety equipment required for abatement such as aviation snips, negative air machines, glove bags and HEPA vacuum based on risk level

F-21.03.05 determine disposal method of contaminated waste according to site and environmental regulations

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Sub-task

F-21.04 Prepares site for removal and containment of asbestos.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

F-21.04.01 determine requirements for decontamination such as number of showers, reliable source of water and electricity and size of bag room

F-21.04.02 cordon off area using asbestos warning tape and post warning signs at all access points

F-21.04.03 plan access routes for disposal considering factors such as clean and clear line of sight

F-21.04.04 set up drain for high risk removals according to environmental regulations

F-21.04.05 spray with amended water using an airless sprayer so asbestos is not friable

Sub-task

F-21.05 **Builds temporary enclosure.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

F-21.05.01	construct sealed containment area using materials such as polyethylene, wooden or steel studs and duct tape to contain friable asbestos
F-21.05.02	set up ground-fault interrupter (GFI) panel for power supply to temporary lighting, negative air machine and hot water tanks
F-21.05.03	maintain decontamination facilities by keeping the area clean and making day-to-day repairs
F-21.05.04	take a clean air sample using an air monitor to establish a baseline
F-21.05.05	site and install negative air machine

Task 22 Performs asbestos removal procedures.

Context Asbestos must be removed with extreme caution, and according to environmental and jurisdictional rules and regulations.

Required Knowledge

K 1	procedures for asbestos removal such as wetting, washing down and double bagging
K 2	hot and cold removal procedures
K 3	decontamination procedures
K 4	monitoring requirements and procedures
K 5	precautions required for removal
K 6	path (clean and clear line and sight) to disposal container bin
K 7	disposal containers and disposal sites
K 8	disposal container labelling systems
K 9	types of temporary enclosures such as glove bags and asbestos hoarding (bubble)

Sub-task

F-22.01 Removes asbestos.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

F-22.01.01	wet and wash down asbestos-related products with amended water using an airless sprayer so asbestos is not friable
F-22.01.02	use glove bags or full enclosure to remove the asbestos using tools such as a vacuum, hose, wire brush and scraper
F-22.01.03	take air sample using an air monitor during removal to ensure adequate PPE is being used and level of removal is adequate
F-22.01.04	ensure there is a backup negative air machine in case of failure
F-22.01.05	maintain asbestos removal equipment by changing filters
F-22.01.06	place asbestos in double bags and seal the bags by goose necking and taping

Sub-task

F-22.02 Disposes of asbestos materials.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

F-22.02.01	wash down bags of asbestos in pr ıration for disposal and transport
F-22.02.02	carry bags of asbestos using a clean and clear line of sight to designated area according to site regulations
F-22.02.03	verify vehicle transporting asbestos has warning placards
F-22.02.04	transport bags of asbestos to disposal location according to jurisdictional, site and environmental regulations
F-22.02.05	unload bags of asbestos at disposal location

Sub-task

F-22.03 **Performs decontamination of area and equipment.**

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

F-22.03.01	spray and wash down asbestos-related products with amended water using an airless sprayer to ensure there is no friable asbestos
F-22.03.02	apply lockdown agent to site and area after removal of asbestos using tools and equipment such as an airless sprayer or pump sprayer
F-22.03.03	take final air sample to ensure air is clear of asbestos fibres
F-22.03.04	remove and dispose of temporary enclosures according to OH&S regulations
F-22.03.05	wash down and clean tools and equipment with amended water before removal from the site
F-22.03.06	re-establish site to original condition
F-22.03.07	follow personnel decontamination procedures according to classification of asbestos abatement

Task 23 Performs maintenance repair.

Context If removal of asbestos is cost-prohibitive or unrealistic, the asbestos must be contained so that the fibres do not become friable. Enclosing asbestos involves boxing it in with material such as metal or drywall. Encapsulating the asbestos entails applying penetrating sealants, sprays or lagging canvas to asbestos to prevent airborne contaminants.

Required Knowledge

K 1	types of encapsulants such as mastics, liquid glues and cements
K 2	methods of application such as spraying and painting
K 3	classifications of asbestos abatement such as type I, II and III to determine risk factors
K 4	types of enclosures such as steel studs, drywall and metal cladding
K 5	sizes and amounts of materials required for each job

Sub-task

F-23.01 Encapsulates asbestos.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	yes	yes	yes	yes	NV	NV	NV

Key Competencies

F-23.01.01	select encapsulant materials such as lockdown and mastic for task at hand
F-23.01.02	prepare encapsulant according to manufacturers' specifications
F-23.01.03	apply encapsulant according to manufacturers' specifications using tools and equipment such as an airless sprayer or paint brush
F-23.01.04	label encapsulated area with asbestos warning label

Sub-task

F-23.02 Encloses asbestos.

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	NV	yes	NV	ND	no	yes	yes	yes	NV	NV	NV

Key Competencies

F-23.02.01	determine method of repair such as boxing, covering and taping according to factors such as type of asbestos abatement classification and size of job
F-23.02.02	design and build permanent enclosure around asbestos using materials such as drywall, plywood and aluminium
F-23.02.03	tape and seal all seams to ensure the enclosure is air tight
F-23.02.04	verify enclosure is structurally sound
F-23.02.05	label enclosure with asbestos warning label and post warnings at all entries according to jurisdictional regulations

APPENDIX

APPENDIX A — TOOLS AND EQUIPMENT

Hand Tools

aviation snips (M1, M2, M3)
band tensioners
brakes
brooms
bungee cords
caulking guns
chisels
clamps
combination machines (beader/crimper)
easy edgers
end nippers
flare staple guns
foam guns
glove bags
hammers
hog ring pliers/C-ring pliers
knives and sheaths
lagging brushes
levels
notchers
paint brushes
paint rollers
pliers
rakes
rasps
rivet guns
rollers
rubber bands
saws (keyhole and hand)
scissors
scrapers
scratch awls
screwdrivers
shears
shovels
staple guns
thermometers
thickness gauges
tie-down straps
tin snips
tool pouches
trowels (pointer and flat)
water hoses
wire brush

Power Tools

band cutting machines
band saws
blow torches
circular saws
drills (cordless and electric)
electric combination machines
electric rollers
electric shears
extension cords
foot operated shears (guillotine)
grinders
High Efficiency Particulate Air (HEPA) vacuum
jig saws
lock formers
mitre saws
mixers
negative air machines
nibblers
pin guns
pin welders
pneumatic tools
powder-actuated tools
pump sprayers
safety edge machines
sewing machines
slitters
stud guns
stud welders

Layout Equipment

calculators
chalk lines
circumference rules
clamps
compasses
dividers
felt pens
mitre charts
pencils
protractors
scale rulers
scribes/scratch awls
squares (carpenters', t-squares, tri-squares)
straight edges
tape measures
trammel points

Spray Equipment

airless sprayers
hopper guns
hoses
spray pumps
sprayers
tip cleaners

Access Equipment

aerial lifts
aerial platforms
garage creepers
ladders
scaffolding
scissor lifts
swing stages

Personal Protective Equipment (PPE) and Safety Equipment

acid suits
disposable booties
disposable coveralls (whites)
eye protection (goggles, safety glasses)
eye wash stations
face shields
fall arrest equipment
fire and chemical resistant coveralls
first aid kits
gloves
hard hats
hearing protection
reflective vests
respirators
safety boots
wristlets

APPENDIX B — GLOSSARY

abatement	to become less severe or widespread; in this analysis, refers to asbestos removal, enclosure or encapsulation in order to minimize health risks
acoustic	sound absorption
amended water	water to which a surfactant (wetting agent) has been added to increase the ability to penetrate the asbestos insulation
barium-impregnated rubber	dense rubber material used in soundproofing
bulkhead	any vertical partition separating compartments on a ship
cladding	covering applied to insulation as a protective or decorative cover
deckhead	under side of a ship's deck viewed from below the ceiling
encapsulate	applying penetrating sealants or sprays to prevent airborne contaminants
enclose	to box in, using materials such as metal or drywall
fire stopping	preventing spread of smoke and fire
fireproofing	protecting material from burning
foil scrim (foil skin)	layered reinforcing consisting of a outer aluminium foil with fibreglass scrim (fibres) in the centre and an inner layer of kraft paper; it is applied to the insulation and comes in rolls to tape seams in insulation
goosenecking	fastening a garbage bag then folding the top down over itself and fastening again, resembling the shape of a gooses neck
gores	piece of flat material such as metal and insulation fabricated to cover an elbow part of the insulation system
head segments	piece of flat material such as metal and insulation fabricated to cover a dome shape part of the insulation system
lags	mitred sections of flat insulating material cut to form a specific shape
plenum	enclosed portion of a structure designed to allow air movement

soundproofing	sound blocking
stud and rail	fastening system for insulation and cladding on equipment such as tanks and boilers
vessel	pressurized container such as propane tanks, exchangers, cylinder tanks
watershed	installation or fabrication technique used to prevent water egress into the insulation

APPENDIX C

ACRONYMS

ASJ	all service jacket
CAD	computer assisted drawing
GFI	ground-fault interrupter
HEPA	high efficiency particulate air
HVAC	heating, venting and air conditioning
MEK	methyl ethyl keytone
MSDS	Material Safety Data Sheet
OH&S	Occupational Health and Safety
PPE	personal protective equipment
PVC	polyvinyl chloride
RFFRK	reinforced foil flame retardant kraft
TSP	tri-sodium phosphate
VOC	volatile organic compound
WHMIS	Workplace Hazardous Materials Information System

APPENDIX D — BLOCK AND TASK WEIGHTING

BLOCK A COMMON OCCUPATIONAL SKILLS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	15	9	NV	11	NV	ND	15	15	10	7	NV	NV	NV	12%

Task 1 Uses and maintains tools and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	15	15	NV	18	NV	ND	25	10	10	15	NV	NV	NV	15%

Task 2 Performs safety-related functions.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	30	20	NV	28	NV	ND	25	15	25	15	NV	NV	NV	23%

Task 3 Organizes work.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	20	28	NV	26	NV	ND	25	15	20	15	NV	NV	NV	21%

Task 4 Performs routine trade practices.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	35	37	NV	28	NV	ND	25	60	45	55	NV	NV	NV	41%

BLOCK B INDUSTRIAL APPLICATIONS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	30	33	NV	54	NV	ND	35	35	50	35	NV	NV	NV	39%

Task 5 Prepares for installation of insulation in industrial applications.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	10	18	NV	16	NV	ND	25	10	25	10	NV	NV	NV	16%

Task 6 Insulates piping and fittings.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
%	30	30	NV	23	NV	ND	25	35	35	20	NV	NV	NV

29%

Task 7 Insulates tanks, vessels and equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
%	30	30	NV	25	NV	ND	25	20	20	20	NV	NV	NV

24%

Task 8 Installs protective cladding.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
%	30	22	NV	36	NV	ND	25	35	20	50	NV	NV	NV

31%

BLOCK C COMMERCIAL APPLICATIONS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	15	32	NV	8	NV	ND	35	30	20	30	NV	NV	NV	24%

Task 9 Prepares for installation of insulation in commercial applications.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
%	10	15	NV	11	NV	ND	25	10	25	10	NV	NV	NV

15%

Task 10 Insulates plumbing systems and mechanical piping.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
%	30	32	NV	27	NV	ND	25	40	25	40	NV	NV	NV

31%

Task 11 Insulates mechanical ducting.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
%	20	28	NV	26	NV	ND	25	30	25	25	NV	NV	NV

26%

Task 12 Insulates mechanical equipment.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
%	40	25	NV	36	NV	ND	25	20	25	25	NV	NV	NV

28%

BLOCK D COMMON APPLICATIONS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	15	11	NV	12	NV	ND	10	10	10	7	NV	NV	NV	11%

Task 13 Installs insulation systems for refractory and cryogenic applications.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	35	15	NV	23	NV	ND	25	35	35	60	NV	NV	NV	32%

Task 14 Installs underground insulating systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	20	22	NV	19	NV	ND	25	10	25	10	NV	NV	NV	19%

Task 15 Insulates for soundproofing.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	20	20	NV	17	NV	ND	25	25	20	10	NV	NV	NV	20%

Task 16 Installs removable covers.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	25	43	NV	41	NV	ND	25	30	20	20	NV	NV	NV	29%

BLOCK E DISTINCTIVE APPLICATIONS

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	20	8	NV	8	NV	ND	0	5	5	10	NV	NV	NV	8%

Task 17 Sprays sealers, coatings and spray-on insulation.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	20	15	NV	21	NV	ND	0	30	50	10	NV	NV	NV	29%

Task 18 Installs fire stop systems.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	35	25	NV	29	NV	ND	0	30	25	40	NV	NV	NV	36%

Task 19 Installs fireproofing.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	20	25	NV	32	NV	ND	0	40	25	40	NV	NV	NV	35%

Task 20 Insulates for marine applications. (NOT COMMON CORE)

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	25	35	NV	18	NV	ND	0	0	0	10	NV	NV	NV	0%

BLOCK F ASBESTOS ABATEMENT

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	National Average
%	5	7	NV	7	NV	ND	5	5	5	11	NV	NV	NV	6%

Task 21 Prepares for asbestos abatement.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	40	30	NV	32	NV	ND	0	35	40	45	NV	NV	NV	32%

Task 22 Performs asbestos removal procedures.

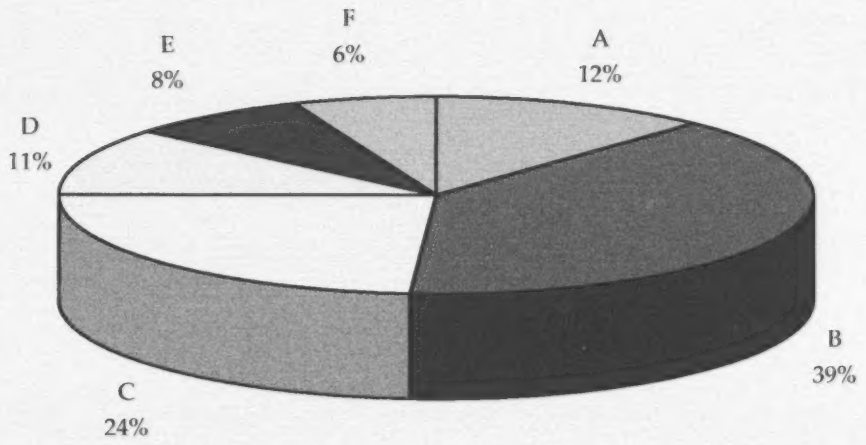
	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	40	40	NV	46	NV	ND	0	50	20	45	NV	NV	NV	34%

Task 23 Performs maintenance repair.

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU	
%	20	30	NV	22	NV	ND	100	15	40	10	NV	NV	NV	34%

APPENDIX E

PIE CHART*



TITLES OF BLOCKS

BLOCK A	Common Occupational Skills	BLOCK D	Common Applications
BLOCK B	Industrial Applications	BLOCK E	Distinctive Applications
BLOCK C	Commercial Applications	BLOCK F	Asbestos Abatement

*Average percentage of the total number of questions on an interprovincial examination, assigned to assess each block of the analysis, as derived from the collective input from workers within the occupation from all areas of Canada. Interprovincial examinations typically have from 100 to 150 multiple-choice questions.

APPENDIX F

TASK PROFILE CHART — Insulator (Heat and Frost)

BLOCKS	TASKS	SUB-TASKS			
A - COMMON OCCUPATIONAL SKILLS	1. Uses and maintains tools and equipment.	1.01 Maintains tools and equipment.	1.02 Uses access equipment.		
	2. Performs safety-related functions.	2.01 Uses personal protective equipment (PPE) and safety equipment.	2.02 Maintains safe work environment.		
	3. Organizes work.	3.01 Performs task scheduling.	3.02 Organizes material on site.		
	4. Performs routine trade practices.	4.01 Performs measurements and calculations.	4.02 Interprets specifications and drawings.	4.03 Prepares substrates.	4.04 Applies sealants.
B - INDUSTRIAL APPLICATIONS	5. Prepares for installation of insulation in industrial applications.	5.01 Selects materials for industrial applications.	5.02 Performs layout for industrial applications.		
	6. Insulates piping and fittings.	6.01 Installs insulation on piping, fittings and hangers.	6.02 Applies vapour barrier on piping and fittings.		
	7. Insulates tanks, vessels and equipment.	7.01 Installs insulation on tanks, vessels and equipment.	7.02 Applies vapour barrier on tanks, vessels and equipment.		

BLOCKS	TASKS	SUB-TASKS			
	8. Installs protective cladding.	8.01 Fabricates cladding components.	8.02 Assembles cladding components.	8.03 Fastens cladding components.	
C - COMMERCIAL APPLICATIONS	9. Prepares for installation of insulation in commercial applications.	9.01 Selects materials for commercial applications.	9.02 Performs layout for commercial applications.		
	10. Insulates plumbing systems and mechanical piping.	10.01 Installs insulation on plumbing systems and mechanical piping.	10.02 Applies vapour barrier on insulated plumbing systems and mechanical piping.	10.03 Installs protective finishes on insulated plumbing systems and mechanical piping.	
	11. Insulates mechanical ducting.	11.01 Installs insulation on mechanical ducting.	11.02 Applies vapour barrier on insulated mechanical ducting.	11.03 Installs protective finishes on insulated mechanical ducting.	
	12. Insulates mechanical equipment.	12.01 Installs insulation on mechanical equipment.	12.02 Applies vapour barrier on insulated mechanical equipment.	12.03 Installs protective finishes on insulated mechanical equipment.	
D - COMMON APPLICATIONS	13. Installs insulation systems for refractory and cryogenic applications.	13.01 Applies insulation to refractory systems.	13.02 Applies insulation to cryogenic systems.	13.03 Applies vapour barrier to insulated components of cryogenic systems.	13.04 Installs reflective and protective jacketing.
	14. Installs underground insulating systems.	14.01 Installs pipe insulation to underground systems.	14.02 Installs pour-in-place insulation to underground systems.		

BLOCKS	TASKS	SUB-TASKS				
	15. Insulates for soundproofing.	15.01 Insulates piping for soundproofing.	15.02 Insulates turbines and equipment for soundproofing.	15.03 Insulates mechanical systems for soundproofing.	15.04 Fabricates acoustic panels.	15.05 Installs acoustic panels to ceilings and walls.
	16. Installs removable covers.	16.01 Fabricates removable covers.	16.02 Fastens removable covers.			
E - DISTINCTIVE APPLICATIONS	17. Sprays sealers, coatings and spray-on insulation.	17.01 Protects surrounding work area for spraying.	17.02 Prepares material, equipment and substrate for spraying.	17.03 Installs reinforcing material for spraying.	17.04 Applies spray insulation, coatings, and sealers.	
	18. Installs fire stop systems.	18.01 Applies fire stop materials to structural, electrical and mechanical components.	18.02 Protects fire stop materials.			
	19. Installs fireproofing.	19.01 Applies fireproofing to structural, electrical and mechanical components.	19.02 Protects fireproofing materials.			
	20. Insulates for marine applications. (NOT COMMON CORE)	20.01 Insulates bulkheads, deckheads and hulls. (NOT COMMON CORE)	20.02 Installs finish material on marine applications. (NOT COMMON CORE)			
F - ASBESTOS ABATEMENT	21. Prepares for asbestos abatement.	21.01 Determines required personal protective equipment (PPE) for asbestos abatement.	21.02 Retrieves sample of asbestos for testing.	21.03 Determines scope of work.	21.04 Prepares site for removal and containment of asbestos.	21.05 Builds temporary enclosure.

BLOCKS	TASKS	SUB-TASKS		
	22. Performs asbestos removal procedures.	22.01 Removes asbestos.	22.02 Disposes of asbestos materials.	22.03 Performs decontamination of area and equipment.
	23. Performs maintenance repair.	23.01 Encapsulates asbestos.	23.02 Encloses asbestos.	